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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,403	09/20/2005	Andrew John Whitehead	266456US6PCT	7068

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C. IRVIN MCCLELLAND
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
BAKER, DAVID S	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 11/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/526,403	WHITEHEAD ET AL.	
	Examiner	Art Unit	
	David S. Baker	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) *1-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *26-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2 March 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The preliminary amendment received on 02 March 2005 has been accepted and entered.

Claim Objections

2. Claim 47 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. See MPEP §608.01(n) part III Infringement Test. If claim 1 recites a method of using a specified product, a claim to the product set forth in claim 1 would not be a proper dependent claim since it is conceivable that the product claim can be infringed without infringing the base method claim if the product can be used by a method other than that recited in the base method claim. In this case, Whitehead has discloses a method of operation that has a wider electric field range (-2V/μm to 2V/μm) than the claimed limitations making the device usable in a manner other than that recited by the base claim. For examination purposes, however, the examiner has examined the claim under the assumption that claims are properly written (see below).

Claim Rejections - 35 USC § 112

3. Claims 26-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The term "high purity" in claim 26 is a relative term which renders the claim indefinite. The term "high purity" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention. For the purposes of examination, however, the term "high purity" has been interpreted to mean that the single crystal CVD diamond contains 95% or more C_4 diamond molecules and 5% or less impurities or dopants (see below). The balance of claims is also rejected as being dependent upon an already rejected base claim.

5. The term "thin" in claim 48 is a relative term which renders the claim indefinite. The term "thin" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention. For the purposes of examination, however, the term "thin" has been interpreted to mean that the layer of high purity single crystal CVD diamond has a thickness of less than 1mm (see below).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 26-45 and 47-49 are rejected under 35 U.S.C. 103(a) as being obvious over Whitehead (WO 200169285 A1) in view of Nam (US Patent #5,527,565 A).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Regarding claim 26, Whitehead discloses a method of detecting radiation comprising: providing a layer of high purity CVD diamond (page 2 paragraphs 4-6, page 3 paragraph 1); applying an electric field of any value between -2V/μm to 2V/μm to the layer (page 5 paragraph 3); exposing the layer to the radiation thereby generating a signal (page 5 paragraphs 1-3); and detecting the signal (page 5 paragraphs 1-3). Whitehead does not disclose expressly that the CVD diamond layer is a single crystal CVD diamond layer. Nam discloses a diamond radiation detector comprising a detection layer of single crystal CVD diamond

(column 2 lines 15-35). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use a single crystal diamond detection layer due to the single crystal structure's higher thermal conductance over a polycrystalline structure thereby allowing the detector to operate in a wider range of temperatures.

Regarding claims 27-29, Whitehead discloses that the diamond layer has a thickness of 1μm to 500μm (page 3 paragraph 1) and that the bias voltage across the electrodes is between -1000V to +1000V (page 5 paragraph 3). This results in applied electric fields that may range from -2V/μm to 2V/μm.

Regarding claims 30-32, Whitehead discloses that the diamond layer has a thickness of 1μm to 500μm (page 3 paragraph 1).

Regarding claims 33-36, Whitehead discloses that the bias voltage across the electrodes is between -1000V to +1000V (page 5 paragraph 3).

Regarding claims 37-39, Whiteman discloses the invention except for the CVD diamond layer reaching at least 80%, 90%, or 95% of saturated charge collection efficiency at the applied electric field. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the CVD diamond layer reach at least 80%, 90%, or 95% of saturated charge collection efficiency at the applied electric field, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 40-43, Whiteman discloses the claimed invention except for the CVD diamond layer being capable of generating at least 7000, 9000,

12000, or 15000 electrons per detection event at the applied electric field. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the CVD diamond layer being capable of generating at least 7000, 9000, 12000, or 15000 electrons per detection event at the applied electric field, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 44, Whitehead discloses that the radiation may be alpha particles (page 2 paragraph 3). Additionally, Whiteman discloses the claimed invention for the CVD diamond layer being such that it generates a peak width (FWHM) in energy of less than 20%, expressed as §E/E. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the CVD diamond layer being such that it generates a peak width (FWHM) in energy of less than 20%, expressed as §E/E, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 45, Whitehead discloses that the radiation may be gamma rays, x-rays, ultraviolet light, alpha particles, and beta particles (page 2 paragraph 3).

Regarding claim 47, Whitehead discloses a high purity single CVD diamond detector (figure 1, page 2 paragraphs 3-5). Whitehead does not disclose a single crystal structure. Nam discloses a single crystal CVD diamond detector (column 2 lines 15-35). At the time the invention was made, it would have been

obvious to a person of ordinary skill in the art to use a single crystal diamond detection layer due to the single crystal structure's higher thermal conductance over a polycrystalline structure thereby allowing the detector to operate in a wider range of temperatures.

Regarding claims 48-49, Whitehead discloses that the CVD diamond layer is a thickness of 1μm to 500μm (page 3 paragraph 1).

8. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Whitehead (WO 200169285 A1), Nam (US Patent #5,527,565 A), and further in view of Jones (US Patent #5,216,249 A).

Regarding claim 46, Whitehead and Nam disclose the claimed invention except for the radiation being neutrons. Jones discloses a neutron detector wherein neutrons are detecting by a CVD diamond layer with connecting electrodes holding the diamond layer at an electric potential (column 1 lines 30-48). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Whitehead's diamond detector to additionally detect neutrons. The motivation for doing so would have been that requiring no additional modifications to physical structure of the detector, the use of the diamond layer to detect neutron would improve the breadth of radiation the detector is qualified to sense making it more versatile.

9. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Whitehead (WO 200169285 A1), Nam (US Patent #5,527,565 A), and further in view of Cotty (US Patent #2,806,145 A).

Regarding claim 50, Whitehead and Nam disclose all the claimed limitation except for the detector being stand-alone, remote, or hand-held. Cotty discloses the use of a diamond radiation detector that is (figure 1, column 1 lines 30-35, column 4 lines 30-55). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to make the detector hand-held. The motivation for doing so would have been to make the device more portable.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Baker whose telephone number is (571) 272-6003. The examiner can normally be reached on MTWRF 9:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSB

DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800